IN THE CLAIMS:

Please cancel claims 3 and 10 without prejudice.

Please amend claims 1, 8, 15 and 16 as indicated in attached Appendix A.

A listing of the status of all claims 1-16 in the present patent application is provided in attached Appendix A.

REMARKS

The Office Action dated June 9, 2004, has been received and carefully considered. In this response, claims 1, 8 , 15 and 16 have been amended, and claims 3 and 10 have been cancelled without prejudice. Reconsideration of the outstanding rejections in the present application is also respectfully requested based on the following remarks.

Applicants note with appreciation the indication on page 3 of the Office Action that claims 3-5 and 10-12 would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

In order to advance the prosecution of the present application, Applicants have amended independent claims 1, 8, 15 and 16 to incorporate the allowable subject matter in claims 3 and 10. Accordingly, claims 1, 8, 15 and 16, as well as the

claims that depend therefrom are all allowable. Acknowledgment of same is respectfully requested.

CONCLUSION

In view of the foregoing, it is respectfully submitted that the present application is in condition for allowance, and an early indication of the same is courteously solicited. The Examiner is respectfully requested to contact the undersigned by telephone at the below listed telephone number, in order to expedite resolution of any issues and to expedite passage of the present application to issue, if any comments, questions, or suggestions arise in connection with the present application.

To the extent necessary, a petition for an extension of time under 37 CFR § 1.136 is hereby made.

Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account No. 50-0206, and please credit any excess fees to the same deposit account.

Respectfully submitted,

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Appendix A

The listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Currently Amended) A method for dynamically allocating a buffer, the method comprising:
estimating a number of active connections;
adjusting a queue threshold for a queue~~, wherein the queue threshold is adjusted based, at least in part, on the number of active connections~~ by setting the queue threshold ($T(n)$) according to the relation:

$$T(n) = \max\left\{\frac{P}{2\hat{N}(n)-1}, \gamma\hat{N}(n)\right\},$$

where P is a bandwidth-delay product, $\hat{N}(n)$ is an estimated number of active connections at measurement time n, and γ is a predetermined parameter that represents a minimum number of packets buffered per connection to avoid a TCP timeout;
computing a drop probability based, at least in part, on the adjusted threshold and a measured queue size;
executing a packet drop routine based upon the drop probability.

2. (Original) The method of claim 1 wherein the step of estimating a number of active connections further comprises:
filtering the estimated number of active connections.

3. (Canceled)

4. (Original) The method of claim 1 wherein the step of computing a drop probability further comprises:
sampling the queue size $q(n)$ at a time n;
calculating an error signal $e(n)$, at time n according to the relation $e(n) = q(n) - T(n)$, where $T(n)$ is the queue threshold at time n; and
calculating a drop probability $p_d(n)$, at time n according to the relation
$$p_d(n) = \min\left\{\max\left[p_d(n-1) + \alpha\frac{e(n)}{2T(n)}, 0\right], \theta\right\},$$ where α is a control gain parameter and θ is a predetermined upper limit on the drop probability.

5. (Original) The method of claim 4 wherein the step of calculating an error signal $e(n)$ further comprises:
filtering the error signal $e(n)$ according to the relation: $(1-\beta)\hat{e}(n-1) + \beta e(n)$, where β is a filter gain parameter and $\hat{e}(n-1)$ is the filtered error signal at time $n-1$.

6. (Original) The method of claim 1 wherein the step of executing a packet drop routine further comprises:
dropping packets according to a random number generator drop scheme.

7. (Original) The method of claim 1 wherein the step of executing a packet drop routine further comprises:
dropping packets according to an inter-drop interval count routine.

8. (Currently Amended) An apparatus for dynamically allocating a buffer, the apparatus comprising:

an active connection estimator for estimating a number of active connections;

a queue threshold adjuster for adjusting a queue threshold for a queue, ~~wherein the queue threshold is adjusted based, at least in part, on the number of active connections~~ the queue threshold adjuster further comprising a module for setting the queue threshold ($T(n)$) according to the relation:

$$T(n) = \max\left\{\frac{P}{2\hat{N}(n)-1}, \gamma\hat{N}(n)\right\},$$

where P is a bandwidth-delay product, $\hat{N}(n)$ is an estimated number of active connections at measurement time n, and γ is a predetermined parameter that represents a minimum number of packets buffered per connection to avoid a TCP timeout;

a drop probability calculator for computing a drop probability based, at least in part, on the adjusted threshold and a sampled queue size; and

a packet drop module for executing a packet drop routine based upon the drop probability.

9. (Original) The apparatus of claim 8 wherein the active connection estimator further comprises:

a filter for filtering the estimated number of active connections.

10. (Canceled)

11. (Original) The apparatus of claim 8 wherein the drop probability calculator further comprises:

a queue size sampler for sampling the queue size $q(n)$ at a time n;

an error signal calculator for calculating an error signal $e(n)$, at time n according to the relation $e(n) = q(n) - T(n)$, where $T(n)$ is the queue threshold at time n; and

a module for calculating a drop probability $p_d(n)$, at time n according to the relation $p_d(n) = \min\left\{\max\left[p_d(n-1) + \alpha\frac{e(n)}{2T(n)}, 0\right], \theta\right\}$, where α is a control gain parameter and θ is a predetermined upper limit on the drop probability.

12. (Original) The apparatus of claim 11 wherein the error signal calculator further comprises:

a filter for filtering the error signal $e(n)$ according to the relation: $(1-\beta)\hat{e}(n-1) + \beta e(n)$, where β is a filter gain parameter and $\hat{e}(n-1)$ is the filtered error signal at time $n-1$.

13. (Original) The apparatus of claim 8 wherein the packet drop module further comprises:

a random number generator drop scheme module.

14. (Original) The apparatus of claim 8 wherein the packet drop module further comprises:

an inter-drop interval count routine module.

15. (Currently Amended) An article of manufacture for dynamically allocating a buffer, the article of manufacture comprising:

at least one processor readable carrier; and

instructions carried on the at least one carrier;

wherein the instructions are configured to be readable from the at least one carrier by at least one processor and thereby cause the at least one processor to operate so as to:

estimate a number of active connections;

adjust a queue threshold for a queue~~, wherein the queue threshold is adjusted based, at least in part, on the number of active connections~~ by setting the queue threshold $(T(n))$ according to the relation:

$$T(n) = \max\left\{\frac{P}{2\hat{N}(n)-1}, \gamma\hat{N}(n)\right\},$$

where P is a bandwidth-delay product, $\hat{N}(n)$ is an estimated number of active connections at measurement time n, and γ is a predetermined parameter that represents a minimum number of packets buffered per connection to avoid a TCP timeout;

compute a drop probability based, at least in part, on the adjusted threshold and a measured queue size;

execute a packet drop routine based upon the drop probability.

16. (Currently Amended) A signal embodied in a carrier wave and representing sequences of instructions which, when executed by at least one processor, cause the at least one processor to dynamically allocate a buffer by performing

the steps of:

estimating a number of active connections;

adjusting a queue threshold for a queue~~, wherein the queue threshold is adjusted based, at least in part, on the number of active connections~~ by setting the queue threshold $(T(n))$ according to the relation:

$$T(n) = \max\left\{\frac{P}{2\hat{N}(n)-1}, \gamma\hat{N}(n)\right\},$$

where P is a bandwidth-delay product, $\hat{N}(n)$ is an estimated number of active connections at measurement time n, and γ is a predetermined parameter that represents a minimum number of packets buffered per connection to avoid a TCP timeout;

computing a drop probability based, at least in part, on the adjusted threshold and a measured queue size;

executing a packet drop routine based upon the drop probability.